Trading Places: When Teachers Utilize Student Expertise in Technology-Intensive Classrooms

the students' role as "teacher" was sporadic, and was initiated by students rather than teachers. Eventually, however, teachers, anxious to save time as well as to offer more assistance to slower students, began to capitalize on student expertise.

Seeing the Benefits

Although many teachers initially questioned the value of using students as teachers, and wondered how it would affect learning, they soon realized the benefits of this role shift. "Slow" students blossomed, "unpopular" students gained peer approval, and "unmotivated" students stayed in at recess to work. Moreover, as students took more responsibility for their learning, they benefited from improved academic performance, increased self-esteem, and a sense of ownership in the instructional process. Although some teachers appeared surprised at these outcomes, most embraced the changes they observed and continued using students as teachers.

Eventually, teachers began using students not only to help one another with the technology, but also to teach each other

the subject-matter content. Teachers reported that there were entire units in which the students presented the material to be learned. Although a few teachers commented that this teaching strategy was more time-intensive than traditional forms of instruction, the role of students as teachers had become accepted, expected, and highly valued by both teachers and students.

The Opportunity for Instructional Change

The introduction of technology to ACOT classrooms did not radically alter instruction overnight. Instead, technology, as a symbol of change, provided teachers with a license for experimentation. As teachers were successful with new methods of instruction, they saw for themselves the value of strategies such as peer tutoring and collaboration, and began to reevaluate their beliefs about learning and teaching. Although technology served as a catalyst for change, teachers also needed the opportunity to reflect on their experiences, a supportive school environment, and the freedom to experiment.

Since its inception in 1985, the Apple Classrooms of Tomorrow (ACOT) project has examined the effects of immediate access to technology on teaching and learning.

In the ACOT research report summarized here, Judith Haymore Sandholtz, Ph.D., and her colleagues discuss how technology-rich environments such as Apple Classrooms of Tomorrow influence and encourage collegial interaction among teachers. To get the complete report, see the information section at the end.

The Relationship Between Technological Innovation and Collegial Interaction

Background

In each ACOT classroom, technology is used as a tool to support learning across the curriculum. That is, no attempt is made to replace existing instructional technologies with computers. In ACOT classrooms, the operating principle is to use the media (textbooks, workbooks, whiteboards, crayons, paper, television, as well as computers) that best support the learning goal. In addition, the project provides a variety of supports for the participating teachers, with the goals of increasing their knowledge about teaching and learning, expanding their technical expertise, and encouraging them to share acquired knowledge and skills. This support includes conferences, training workshops, professional release time, and a telecommunications network that permits electronic communication among ACOT teachers and staff.

This study covered a five-year period, using data from 32 elementary and secondary teachers in five schools located in five different states. The sources of data include weekly reports sent via electronic mail, correspondence between sites, and bimonthly audiotapes on which teachers reflected about their experiences.

Progressive Stages of Interaction

The researchers found that, as the ACOT teachers became more comfortable with the technology, and as they adopted it into their teaching practices, the nature of their collegial interaction changed. At the beginning, it was informal and primarily provided emotional support. Over time, however, the interactions progressed to include technical assistance, then instructional sharing, and, eventually, collaboration.

Emotional support. At the beginning of the project, teachers had little time for collegial interaction because they were so involved with learning to use the new technology. As the year progressed, the frequency of interaction among teachers increased, but exchanges remained informal, and focused on emotional support, as teachers shared their frustrations and successes.

Technology assistance. As teachers became more familiar with the new technology, they began to help one another. Through formal meetings, weekly reports, and electronic-mail communications, teachers increasingly shared ideas for managing and operating the equipment, locating relevant software, and dealing with problems. This process of peer technical support helped the teachers to use the new technology in their instruction.

Instructional sharing. When teachers ventured beyond text-based drill and practice and experimented with new technology-based applications, they felt motivated to share their instructional strategies. Once they began to feel comfortable with increased interaction among both students and teachers, they also started to observe one another's teaching methods,

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as opposed to simply discussing ideas. They also shared new techniques with teachers in their schools who were not directly involved in the ACOT project.

Collaboration. Eventually, teachers not only shared ideas but also jointly planned and developed new methods. In fact, the greatest degree of collaboration occurred at sites that formalized team-teaching arrangements. At first, teachers saw only the obstacles associated with team-teaching: the differences in personalities, in level of technical knowledge, in teaching styles, in grading policies, and in disciplinary strategies. However, when teachers overcame these obstacles, they reaped the following benefits:

* Shared responsibilities

* Increased flexibility in grouping students

* Increased student ability to handle advanced material

* Increased camaraderie, enthusiasm, and support

* Development of an interdisciplinary curriculum

* Development of new ideas and teaching methods

* Development of activities based on teacher strengths

Implications

This study points out the symbiotic relationship between innovation and collegial interaction: Using technology encouraged teachers to be more collegial and to share instruction. In fact, teachers who already enjoyed a high level of collegiality embraced innovation in technology and instruction more quickly. Team teaching, increasingly practiced, led to cross disciplinary instruction that was beneficial to both students and teachers. In addition, the view that team teaching is more demanding than beneficial changed.

The report highlights the following points that are relevant to teaching practice and educational research:

* Change is slow, so schools must take a long-term perspective.

* Change occurs fastest when innovation and collegial interaction happen simultaneously.

* The introduction of technology can be a catalyst for change.

* Teachers commit to innovation when it makes a positive impact on their practice.

More Information

The complete report is part of the ACOT Research Portfolio, a packet that includes five research reports, three information sheets, and a bibliography. The packet is available for $7.00 (plus shipping, handling, and applicable taxes) from the Apple Starting Line Program. Call 1-800-825-2145 to order by credit card or for information about using a purchase order. Request part number L0328LL/A.

You can also download the report from AppleLink. To find it, use the following path: K-12 Education: Education Resources: Apple Classrooms of Tomorrow/Learning Technologies: Research Reports.

Since its inception in 1985, the Apple Classrooms of Tomorrow (ACOT) project has examined the effects of immediate access to technology on teaching and learning.

In the ACOT research report summarized here, Robert J. Tierney, Ph.D., and his colleagues discuss the extent to which students use the computer to expand their ways of knowing, sharing, and collaborating. To get the complete report, see the information section at the end.

Computer Acquisition: A Longitudinal Study of the Influence of High Computer Access on Students' Thinking, Learning, and Interactions

Background

This study followed six students through four years of high school, documenting the impact of unlimited access to computer tools on their thinking, their approach to learning, and their interactions with others. Data sources included detailed observations of the students as well as lengthy interviews. Unlike most studies on the impact of computers, this one was not limited to a brief time frame, and the longitudinal nature allowed for an assessment of individual shifts in learning over an entire high school experience.

The study identifies eight competencies acquired during the students' four years: dynamic exploration and representation of information, experimentation and problem solving, social awareness and confidence, effective communication, computer use, independence, expertness and collaboration, and a positive orientation to the future. These are similar to skills identified by the U.S. Department of Labor as critical to the workplace.

Changing Perceptions

Desktop publishing, scanning, and multimedia spurred dramatic shifts, both in how the students perceived the computer and in how they represented and communicated ideas. In the ninth grade, for example, most students referred to "accuracy and neatness" as the major

attributes of the computer, and they approached text in a limited fashion. (Layout was predetermined and conventional, subject matter was linear, and the audience was an afterthought.)

By the eleventh and twelfth grades, as their sense of documents as communication vehicles evolved, the students wanted their work to be more engaging than traditional text. And they saw the computer as a useful tool to help them convey ideas.

During each of the four years of their involvement in ACOT, all six students went through shifts in their approach to writing reports and preparing presentations. As their comments showed, access to computers engendered confidence in their writing abilities, and the advent of graphics changed their approach to the development and view of text. They also seemed to have developed a sense of their own expertise, a recognition of various functions of technology, and an appreciation of the skills they needed—including the ability to work with others.

Growing Appreciation

High school students often take a dim view of their learning experiences—and their own abilities as learners—if that experience lacks relevance. The research showed, however, that ACOT seems to have provided these six students with

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an experience that was different in direction and kind. Their involvement with computers was not seen as superfluous, but as integral.

In year one, the students were hesitant about their abilities, and tentative about their future. By year four, all six students in the study had developed a respect for their own capabilities and a sense of their strengths and weaknesses. Overall, the students demonstrated an appreciation of their learning experiences and an awareness of the computer as a powerful tool. They indicated that the computer enhanced their ability to do problem solving and communicate ideas effectively, to use alternative symbol systems, to establish goals for themselves, and to evaluate their work and experiences. They also recognized the relevance of the skills they had acquired for the achievement of career and personal goals.

The observations and interviews also suggest that the students engaged in a variety of different forms of collaborations for many different purposes, and that these collaborations formed an integral dimension of their learning.

Implications

The researchers found that the students became independent and collaborative problem solvers, communicators, record keepers, and learners with the computers. In addition, they found that the ACOT environment invited students to interact with their teachers and peers in a number of projects, and gave them the opportunity to engage in productive and creative experiences, rather than in activities or assignments that were overly prescribed and rote. The ACOT students developed a repertoire of abilities which allowed them to explore possibilities that would be either too cumbersome or difficult to attain without the technology.

The students' comments, reported in the study, show some of the shifts in their approaches to the development of documents and to how knowledge may be represented, to experimentation, to the communication of ideas, to their goals, and to their views of themselves as learners.

More Information

The complete report is part of the ACOT Research Portfolio, a packet that includes five research reports, three information sheets, and a bibliography. The packet is available for $7.00 (plus shipping, handling, and applicable taxes) from the Apple Starting Line Program. Call 1-800-825-2145 to order by credit card or for information about using a purchase order. Request part number L0328LL/A.

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